

Comparison of a Poultry Litter Fertilizer Program to a Commercial Fertilizer Program in Soybeans

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Objectives

This multi-year research project is designed to compare a fertility program using commercial fertilizers to a fertility program using poultry as a source for phosphorus and potassium.

Background

Cooperator:	Farm Focus, Inc.	2,4-D LVE + 17 lb/100 gal
County:	Van Wert	AMS
Soil Type:	Hoytville clay, Haskins loam	POST (June 22): 32 oz/A Glyphomax Plus + 17
Drainage:	Tile- nonsystematic	lb/100 gal AMS
Previous Crop:	Corn	Insecticide: None applied
Tillage:	No-till	Variety: Golden Harvest H2698RR
Soil Test(2002):	pH 6.2, P 33 ppm, K 137 ppm	Row Width: 7.5 inches
Fertilizer:	See Methods	Planting Rate: 225,000 seeds/A
Herbicide:		Planting Date: May 4, 2004
PREPLANT:	1.0 oz/A Python + 1.5 pt/A	Harvest Date: October 1, 2004
(April 24)	Glyphomax Plus + 1 pt/A	

Methods

This study is set up with two treatments replicated four times in a randomized complete block design. One treatment consists of a soil fertility program based solely on the use of commercial fertilizers; the other treatment is a soil fertility program based on a combination of poultry litter as a source for phosphorus and potassium and commercial fertilizers to supply nitrogen requirements.

Each plot is 105 ft wide by 1030 ft long, for an area of 2.48 acres per plot. Twenty random soil cores were taken from each plot during fall 2003. The cores were mixed in a plastic container, and the composite sample was analyzed for pH, exchangeable potassium, and exchangeable phosphorus. Soil test results were used to determine the amount of commercial fertilizer required. For the plots in the commercial fertilizer treatment, phosphorus and potassium needs were determined based on Tri-State Fertility recommendations, and fertilizer was surface broadcast on November 7, 2003. The poultry(chicken) litter used in this trial contained 77 lbs. P₂O₅, 57 lbs. K₂O, and 31 lbs. total nitrogen per ton based on laboratory analysis. A single 3.75 ton/acre application rate was made for each poultry litter plot on April 16, 2003. This single application provided a total of 289 lbs. P₂O₅, and 214 lbs. K₂O for the poultry litter plots.

Harvest populations (September 22) were estimated by counting the number of plants in a row on each side of a 10 foot section at three different locations in each individual plot. The average

of the number of plants counted per 10 feet was converted to plants per acre. Yields were collected from two combine rounds (56 feet width) from the center of each plot. Individual plot weight and moisture was determined using a calibrated AgLeader PF3000 yield monitor in a John Deere 6620 combine. Yields reported in this study have been adjusted to a 13% moisture standard.

Results

Table 1. Soybean harvest population, moisture, and yield means.

Treatment	Harvest Population (plants/A)	Moisture (%)	Yield (bu/A)
Commercial Fertility	186,400	13.3	55.4
Poultry Litter	191,400	13.3	56.1
LSD (0.05)	NS	NS	NS
F-test	<1	<1	<1
CV (%)	6.3	<1	6.4

NS= not significant

Table 2. Soil test data.

Treatment	2002	2003	2004
	----- pH -----		
Commercial Fertility	6.4	6.2	6.2
Poultry Litter	6.4	6.3	6.5
	-- Potassium (ppm) --		
Commercial Fertility	162.9	167.3	192.3
Poultry Litter	151.3	180.1	182.5
	-- Phosphorus (ppm) --		
Commercial Fertility	38.4	44.4	43.6
Poultry Litter	34.6	48.3	49.3

Summary

Results from this year's study indicate there was no statistical difference between the two treatments with regards to harvest population, moisture or yield. This data supports results from 2003 that indicate no statistical difference with regards to harvest population, moisture or yield when corn was the study crop.

Three-year soil test data indicates no pattern for soil test potassium levels as they relate to each treatment, but there appears to be a pattern of increased phosphorus soil test levels for the poultry

litter compared to the commercial fertilizer program. Further, there also appears to be an increase in soil pH when comparing poultry litter to a commercial fertilizer program.

Based on soil test data in 2002 and poultry litter analysis, a single 3.75 ton/acre application of poultry litter should supply supplemental nutrients (excluding nitrogen) for three or more years based on a corn, soybean, and wheat rotation. At the time of poultry litter application (Spring, 2003), the poultry litter system cost \$20/ton which included spreading and delivery charges. This equates to a per acre cost in this study of \$75/acre. The \$75/acre cost for the poultry litter system is for at least a three-year period. The commercial fertilizer applied to cover the soil test requirements for phosphorus and potassium in the commercial treatments cost \$8.28/acre for 2003, and \$7.53/acre for 2004. Adding the application fee of \$4.50/acre/year, the total cost for the commercial fertilizer treatments for the first two years (2003-2004) is \$24.81/acre.

Data summarized in this report is part of a three-year study that compares a fertility program using commercial fertilizers to a fertility program using poultry litter plus commercial fertilizer. The study field was planted to corn in 2003 and soybeans in 2004. The study will be continued in 2005 with wheat.

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